CLAIMS

1. A method for determining a time border and a frequency resolution in spectral envelope coding of an audio signal utilizing a time/frequency grid, said method comprising:

deriving a start time border of a current frame from an end time border of a previous frame of envelope data;

detecting, by a transient detector, a transient time slot in spectral data between the start time border and the end time border within a predetermined allowed region, a degree of the transient exceeding a certain drasticness; and

finding and instantiating an actual end time border and intermediate time borders in the spectral data between the transient time slot and the end time border of the current frame within the predetermined allowed region by comparing the transient drasticness with a predetermined signal variation criterion.

2. The method for determining the time border and the frequency resolution according to Claim 1, further comprising

deriving the frequency resolution in a time segment by evaluating energy of every frequency band partitioned by low-resolution borders represented by a predetermined frequency for every time segment obtained by dividing the current frame using the intermediate time borders and the end time border.

3. The method for determining the time border and the frequency resolution according to Claim 1

wherein, when an allowed number of borders has been exhausted but a distance between the start time border and the end time border does not satisfy a minimum required value, a distance between the start time border and an intermediate border nearest the end time border in the current frame is expanded until a

minimum required value is attained,.

4. The method for determining the time border and the frequency resolution according to Claim 1,

wherein more intermediate time border is instantiated in the spectral data between the transient time slot and the start time border by evaluating the predetermined signal variation criterion, when the allowed number of borders has not been exhausted.

5. The method for determining the time border and the frequency resolution according to Claim 1,

wherein the finding of the intermediate time border includes first defining a temporary time segment with a previously found time border and a moving time border which moves progressively away from the previous time border, and then evaluating the signal variation criterion for every move the moving time border makes.

6. The method for determining the time border and the frequency resolution according to Claim 5,

wherein the signal variation criterion is a ratio between minimum energy of a time slot within the temporary time segment and average energy of the temporary time segment.

7. The method for determining the time border and the frequency resolution according to Claim 6

wherein a new intermediate border or an end border is instantiated according to the moving time border to define a new time segment, when the computed ratio exceeds a threshold.

8. The method for determining the time border and the frequency resolution according to Claim 3

wherein the expansion of the intermediate border can occur

to a time segment furthest away from the transient time slot within the frame first, and time segments nearer to the transient time slot are considered only when the expansion of the further border has reached its syntactic limit.

9. The method for determining the time border and the frequency resolution according to Claim 3

wherein the expansion of the intermediate border can also try to increase every time segment, check signal characteristics of the new time segment formed, and applies the actual increase to the time segment that causes the least overall increase in between-border signal variations.

10. The method for determining the time border and the frequency resolution according to Claim 2

wherein the signal variation criterion is evaluated by computing ratios between the energies of the frequency bands for every time segment found, and when minimum of the ratios exceeds a threshold, a high frequency resolution is adopted; Otherwise, a low frequency resolution is adopted.

11. The method for determining the time border and the frequency resolution according to Claim 10

wherein the threshold is higher in a plurality of time segments including and immediately following the transient time border, to make it more difficult to switch to high frequency resolution in the region including the transient time slot.

12. A method for determining a time border and a frequency resolution by a bandwidth expansion technology in spectral envelope coding of an audio signal utilizing a time/frequency grid, said method comprising:

transforming the audio signal into a plurality of low-frequency subband signals by an analysis filterbank;

replicating portions of the subband signal to a high-frequency region, dividing the replicated subbands into time segments using time borders information and subsequently into frequency bands using frequency resolutions information, and subsequently adjusting the subbands by envelope data; and

transforming the low-frequency subband signals and the envelope-adjusted subband signals into a bandwidth-expanded time domain signal,

wherein said method further comprising:

deriving a start time border from an end time border of a previous frame of envelope data;

detecting, by a transient detector, a most drastic transient time slot in spectral data between the start time border and furthest allowed end time border;

finding and instantiating an actual end time border and intermediate time borders in the spectral data between the transient time slot and the furthest allowed end time border by evaluating a signal variation criterion; and

deriving the frequency resolution by evaluating energy of every frequency band partitioned by low-resolution borders for every time segment obtained by the dividing of the replicated subbands.

13. A method for determining a time border and a frequency resolution in spectral envelope coding of an audio signal utilizing a time/frequency grid, said method comprising:

deriving a start time border from an end time border of a previous frame of envelope data;

detecting, by a transient detector, a most drastic transient time slot in spectral data between the start time border and the

furthest allowed end time border;

detecting which of the regions, one between a transient border and the start time border, another between the transient border and the furthest allowed end time border, has a most varying spectral data;

when the most varying spectral data is found in the region between the transient border and the furthest allowed end time border, finding and instantiating an actual end time border and intermediate time borders in the region by evaluating a signal variation criterion;

When the most varying spectral data is found in the region between the transient border and the start time border, finding and instantiating intermediate borders in the region by evaluating a signal variation criterion, then finding and instantiating an actual end time border and intermediate time borders in the other region by evaluating a signal variation criterion; and

deriving the frequency resolution by evaluating energy of every frequency band partitioned by low-resolution borders for every time segment obtained by dividing of subbands.

14. A method for determining a time border and a frequency resolution by a bandwidth expansion technology in spectral envelope coding of an audio signal utilizing a time/frequency grid, said method comprising:

transforming the audio signal into a plurality of low-frequency subband signals by an analysis filterbank;

replicating portions of the subband signal to a high-frequency region, dividing the replicated subbands into time segments using time borders information and subsequently into frequency bands using frequency resolutions information, and subsequently adjusting the subbands by envelope data; and

transforming the low-frequency subband signals and the

envelope-adjusted subband signals into a bandwidth-expanded time domain signal,

wherein said method further comprising:

deriving a start time border from an end time border of a previous frame of envelope data;

detecting, by a transient detector, a most drastic transient time slot in spectral data between the start time border and the furthest allowed end time border;

detecting which of the regions, one between a transient border and the start time border, another between the transient border and the furthest allowed end time border, a most varying spectral data;

When the most varying spectral data is found in the region between the transient border and the furthest allowed end time border, finding and instantiating an actual end time border and intermediate time borders in the region by evaluating a signal variation criterion;

When the most varying spectral data is found in the region between the transient border and the start time border, finding and instantiating intermediate borders in the region by evaluating a signal variation criterion, then finding and instantiating an actual end time border and intermediate time borders in the other region by evaluating a signal variation criterion; and

deriving the frequency resolution by evaluating energy of every frequency band partitioned by low-resolution borders for every time segment obtained by the dividing of the replicated subbands.

15. A program coded in programming language which provides a function achieved by the method for determining the time border and the frequency resolution according to any one of Claims 1 through 14.

16. A data recording medium for storing the program according to Claim 15.

17. A device for determining a time border and a frequency resolution in spectral envelope coding of an audio signal utilizing a time/frequency grid, said device comprising:

a start time border derivation unit operable to deriving a start time border of a current frame from an end time border of a previous frame of envelope data;

a detection unit operable to detecting a transient time slot by a transient detectior in spectral data between the start time border and the end time border within a predetermined allowed region, a degree of the transient exceeding a certain drasticness;

an instantiation operable to finding and instantiating an actual end time border and intermediate time borders in the spectral data between the transient time slot and the end time border of the current frame within the predetermined allowed region by comparing the transient drasticness with a predetermined signal variation criterion; and

a frequency resolution derivation unit operable to deriving the frequency resolution in a time segment by evaluating energy of every frequency band partitioned by low-resolution borders represented by a predetermined frequency for every time segment obtained by deviding the current frame using the intermediate time borders and the end time border.